



Sri Ramakrishna Mission Vidyalaya College of Arts and Science Coimbatore - 641020

(An Autonomous College Re-Accredited with "A" grade by NAAC and Affiliated to
Bharathiyar University, Coimbatore)

B.Voc., Degree course (Three years)

Production Technology (Tool & Die)

(An UGC sponsored DDU-KAUSHAL KENDRA Programme)

SYLLABUS

(ACADEMIC YEAR 2019-2020 Onwards)

**Sri Ramakrishna Mission Vidyalaya College of Arts and
Science**

(AUTONOMOUS)

For Students admitted from 2019-2020& onwards

COURSE OF STUDY

- Syllabus is framed for B.VOC in Production Technology (Tool & Die) according to UGC norms and National Vocational Education Quality Framework
- There are 2 components. They are General components of 24 credits and Skill components of 36 credits.
- One credit is equal to 15 hours for theory and 30 hours for practical. Practical could be either in the campus or in the working place of the Industry.

ELIGIBILITY:

- Candidates who have successfully completed their Higher Secondary (10+2) will be eligible for admission.

PROGRAMME OUTCOMES:

The Department of Production Technology (Tool & Die) provides the practical learning environment for the students which aim to meet out the industrial requirements in the field of Production and Manufacturing by providing more practical exposures and on job trainings.

The program Educational Objectives are as follows:

PO1: Provide graduates with the fundamental knowledge in science and mathematics required to understand the principles of Engineering.

PO2: Develop creative and innovative thinking ability of the students which are required for industry.

PO3: Create a technically skilled employee by imparting theoretical, practical and on job training to students.

PO4: Imparting the leadership qualities required for team work, production planning, decision making and industrial safety, so that they are work ready at exit point of the programme.

PO5: Create well disciplined and responsible citizens for the overall welfare of our nation.

PROGRAMME SPECIFIC OUTCOMES:

PSO1: Ability to apply the knowledge of basic engineering principles in tool and die making.

PSO2: An ability to use the techniques, skills and modern engineering tools.

PSO3: An ability to design a system, component or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

PSO4: An ability to function on multidisciplinary teams.

PSO5: Ability to use techniques, Skills and modern engineering tools required to develop new product with updated features and improved performance.

BASICS OF PRODUCTION

Course code	19KUP1C01	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

Course Outcomes (CO)

CO1	Student will be able to know about the basic concepts in manufacturing, various casting technologies, measurement, quality, various properties of different materials, metal forming and powder metallurgy.	K,U&S
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K-Knowledge U- Understand S-Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M		S	S	S	M	L

S - Strong; M - Medium; L - Low

PRODUCTION TECHNOLOGY - I

Course code	19KUP1C02	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

Course Outcomes (CO)

CO1	Student will be able to do any type of fitting in metal components.	K,U&S
CO2	Student will be able to operate a lathe to produce any component.	U & S
CO3	Student will be able to work safely in a workshop.	U&S

K-Knowledge U- Understand S-Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M		S	S	S	S	L
CO2	S	S	S	S	M		S	M	S	M	L
CO3	S	S	S	S	S		S	S	S	S	L

S - Strong; M - Medium; L - Low

PRODUCTION TECHNOLOGY - II

Course code	19KUP2C03	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	II

Course Outcomes (CO)

CO1	Student will be able to operate all the special machines used in production.	K,U&S
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K-Knowledge U- Understand S-Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M		S	S	S	S	M

S - Strong; M - Medium; L - Low

ADVANCED PRODUCTION TECHNOLOGY

Course code	19KUP3C04	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	III

Course Outcomes (CO)

CO1	Develop knowledge to operate CNC machines, EDM and IM machines.	K&U
CO2	Learning a part program for any component and setting up in machines.	K,U&S
CO3	Understand and find the ideas to select the AM process for a particular job.	K,U&S

K- Knowledge, U - Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S		S	S	S	M	L
CO2	S	S	S	M	S		S	S	S	M	L
CO3	S	S	S	S	S		S	S	S	S	M

S - Strong; M - Medium; L - Low

TECHNICAL DRAWING

Subject code	18KUG4AL4	Credits	4	Year	II
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	IV

Course Outcomes (CO)

CO1	Apply the Skill in the Geometric construction.	K & S
CO2	Understand and Develop the Orthographic and Isometric projections.	U & S
CO3	Remember the symbols widely used in Electrical and Electronics circuits.	K & U

K- Knowledge, U - Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	L	M		M	S	M	L	L
CO2	M	S	M	L	M		M	S	M	L	L
CO3	S	S	M	L	S		M	S	M	L	L

S - Strong; M - Medium; L - Low

PRINCIPLES OF MANAGEMENT

Subject code	18KUG4EL1	Credits	4	Year	II
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	IV

Course Outcomes (CO)

CO1	Understand the basic managerial functions of an organization	U
CO2	Develop the leadership qualities and planning attitude	K & U

K- Knowledge, U - Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	L	L	L	S	M	L	M	M	S	S
CO2	M	M	M	S	M	L	S	S	S	S

S - Strong; M - Medium; L - Low

DRAFTING AND PLOTTING

Course code	18KUP4C05	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	IV

Course Outcomes (CO)

CO1	Student will be able to create and edit the design.	K,U&S
CO2	Student will be able to modify the designs as per the requirement.	K,U&S

K-Knowledge U- Understand S-Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S	S	S	S	L	M
CO2	S	S	M	S	S	S	M	S	M	L

S - Strong; M - Medium; L - Low

Total Quality Management

Subject code	18KUG5EL2	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	V

Course Outcomes (CO)

CO1	Gain the knowledge of Quality management principles and Techniques.	K
CO2	Understand the importance of the Quality and apply in industry.	U & S

K- Knowledge, U - Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	L	M	L	S	S		L	M	M	S	S
CO2	L	M	L	S	S		L	M	M	S	S

S - Strong; M - Medium; L - Low

TOOL DESIGN - I

Course code	19KUP5C06	Credits	05	Year	III
No. of Lecture Hours	75	No. of Practical Hours	--	Sem	V

Course Outcomes (CO)

CO1	Student will be able to differentiate jig and fixture	K & U
CO2	Student will be able to design a jig or fixture for a special purpose	U & S
CO3	Student will be able to mount a jig or fixture in any machine component.	K&U

K- Knowledge, U - Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	L	M		S	S	S	L	L
CO2	S	S	S	L	S		S	S	S	M	L
CO3	S	S	S	L	M		S	S	S	L	L

S - Strong; M - Medium; L - Low

PROFESSIONAL ETHICS AND HUMAN VALUES

Subject code	18KUG6EL4	Credits	4	Year	III
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	VI

Course Outcomes (CO)

CO1	Create awareness of Ethics and moral values.	K & U
CO2	Understand the importance of Ethics and code of conduct in business.	K & U
CO3	Understand social responsibility in business and importance of human values	U & S

K- Knowledge, U - Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	L	L	L	S	M	L	L	L	S	S
CO2	L	L	L	S	M	L	L	L	S	S
CO3	L	L	L	S	M	L	L	L	S	S

S - Strong; M - Medium; L - Low

Safety Engineering

Subject code	18KUG6EL5	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	VI

Course Outcomes (CO)

CO1	Understand the importance of safety.	U
CO2	Able to handle the materials and tools safely.	K,U& S
CO3	Follow the road and electrical safety.	U & S

K- Knowledge, U - Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	S	M		M	M	M	S	S
CO2	S	S	S	S	S		S	S	S	S	S
CO3	S	S	S	S	S		S	S	S	S	S

S - Strong; M - Medium; L - Low

Entrepreneurship Development

Subject code	18KUG6EL6	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	VI

Course Outcomes (CO)

CO1	Understand concept of finance institutions, project report, incentives and subsidies.	U
CO2	Develop the qualities to become an entrepreneur	K,U& S

K- Knowledge, U - Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	M	M	L	S	M	L	M	M	S	S
CO2	M	M	M	S	M	L	M	M	S	S

S - Strong; M - Medium; L - Low

TOOL DESIGN - II

Course code	19KUP6C07	Credits	05	Year	III
No. of Lecture Hours	75	No. of Practical Hours	--	Sem	VI

Course Outcomes (CO)

CO1	Students will be able to design the die for die casting process.	U&S
CO2	Student will be able to design a die for injection moulding process.	K,U & S

K- Knowledge, U - Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	L	S		S	S	S	M	L
CO2	S	S	S	M	S		S	S	S	M	L

S - Strong; M - Medium; L - Low

BASICS OF PRODUCTION

Subject code	19KUP1C01	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

Unit I : Materials Properties

Introduction: Internal forces, Stresses and strains, Types of stress and strain, Elasticity, Hooke's law, Poisson's ratio, Elastic constants and their relationship. Stress-strain diagram for ductile materials. Definition of creep, fatigue and stress relaxation. Types of materials - Properties of materials : **Hardness, ductility, weldability, machinability, elasticity, plasticity, malleability**, etc.,

Unit II : Casting Process

Introduction - Casting - Casting types - procedure to make sand mould - types of core making - moulding tools - machine moulding - special moulding processes - CO2 moulding - shell moulding - investment moulding - permanent mould casting - pressure die casting - centrifugal casting - continuous casting - casting defects - Basic steps in the process of metal casting; Patterns: Materials, types and design of Patterns, Pattern, Pattern allowances.

Unit III : Metal Forming Process

Principles and applications of the following processes: Forging - Rolling - Extrusion - Wire drawing and Spinning - **Powder metallurgy** - Principal steps involved advantages, disadvantages and limitations of powder metallurgy.

Unit IV : Measurement Process

Measurement - Types of measurement - Direct and indirect - Linear measurement - Angular measurement - Profile checking - Calipers : Vernier, inside, outside - Gauges : Plug, Ring, Thread, Slip, Feeler, Vernier height gauge, Vernier Depth gauge - Micrometer : Outside, Inside, Depth - Least count.

Unit V : Quality Process

Quality - Visual inspection - Measuring instruments - Types - Error - Calibration - Range - Selection - Measurements - System of measurement - Imperial system - Metric system - Quality standards - Quality control procedures - Inspecting equipments - Inspection - Hazards - Equipments.

REFERENCE:

- Complete casting handbook 1st and 2nd Edition by John Campbell, Aug 2011 and 2015.
- Applied metrology for Manufacturing Engineering by Ammar Grous.
- Engineering Metrology and Instrumentation by R.K.Rajput.
- Materials Science and Engineering by Callister.
- Powder Metallurgy Technology by G S Upadyay.

PRODUCTION TECHNOLOGY - I

Subject code	19KUP1C02	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

Unit I:

Working safety - Health and safety - environmental and operating conditions - Safety considerations - Personal protective equipment (PPE) - Safety regulations - Tools and equipments - Hand tools - Machine tools - Safety Instructions.

Unit II

Fitting - Types of fitting - Fitting tools - Equipments - Reporting - Preparation of work area - Selection of raw materials - Inspection - Selection of tools and equipments - Work holding devices - Marking - Templates - Transfer / Trace - Hand tools and manually operated machine tools for fitting - Assembling - Inspection.

Unit III:

Various operations in fitting - Drilling, Reaming, Boring, Tapping - Assembling equipments - Fasteners - Adhesives - Soldering - Brazing - Dismantling and assembling - Problem solving - Tool and die - Measure - Inspect - Procedure.

Responsibility - Allocation of responsibility - ensure and inspect - Release drawings, machining specifications, process planning, production planning to operators - Selection of tools - Selection of equipments - Selection of materials.

Unit IV

Mechanics of chip formation, single point cutting tool, forces in machining, Types of chip, cutting tools- nomenclature, orthogonal metal cutting, thermal aspects, cutting tool materials, tool wear, tool life, surface finish, cutting fluids and Machinability.

Unit V

Centre lathe, constructional features, specification, operations - taper turning methods, thread cutting methods, special attachments, machining time and power estimation. Capstan and turret lathes- tool layout - automatic lathes: semi automatic - single spindle : Swiss type, automatic screw type - multi spindle.

REFERENCE:

- Fitting and machining by Ron Culley published by TAFE Publications.
- Mechanical Technology Grade 10: Fitting and machining learner book by D Meyer and BH Van Der Westhuizen.
- Fitter trade theory by Balbir Singh.
- The Lathe book : A complete guide to the machine and its accessories by Ernie Conover
- The metal Lathe by David J Gingery

PRODUCTION TECHNOLOGY - II

Subject code	19KUP2C03	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	II

Unit I

Milling - Types of milling - Milling machine - Types - Constructional features - Main parts - Working principle - Inspection of machine - Cutters - Types - Work holding devices - Cutter holding devices - Flexibility of machine - Various operations - Gear cutting - Indexing head - indexing mechanism - Cutter - Types of cutter - Selection of cutter.

Unit II

Abrasive processes: grinding wheel - specifications and selection, types of grinding process - cylindrical grinding, surface grinding, centreless grinding and internal grinding - Typical applications - Grinding wheel - Designation - Preparation - Abrasives and types.

Unit III

Bond - Types of bonds - Materials - Preparation - Types - Various operations - Mounting of grinding wheels - Steps in mounting - Safety considerations - Speed - Feed - Depth of cut - Surface finish - Factors affecting surface finish - Dressing and truing of wheels - Cutter - Diamond cutter.

Unit IV

Work holding devices - Selection - Set - Mark - Prepare the work - Selection of tool - Stone - Wheel - File - Abrasives - Specification of grinding wheel - Factors considered for selection - Bond - Types - Wheel types - Cut-off discs (Diamond blade) - Abrasive grinding discs - Grinding stones - Wire brush wheels.

Unit V

Control setting - Work handling - Grinding machine - Types - Angle grinders - Bench grinders - Straight grinders - Rotary die grinders - Disc grinder - Electronic grinder - Electric grinder - Hydraulic grinder - Pneumatic grinder - Pedestal grinder - Cylindrical grinder - Inspection - Surface finish - Geometric dimensions - Common surface imperfections - Errors - Texture - Roughness - Secure tools and equipments - Repairing - Maintenance - Types - Documentation - Job card - Progress reports - Incident reports - Support - Monitor.

REFERENCE:

- Machinist handbook for the apprentice by David B Smith
- Fundamentals of Machining processes : Conventional and Nonconventional Processes by Hassan Abdel - Gawad Ei-Hofy.
- Milling - A complete course by Harold Hall
- Grinding Technology 2nd Edition by Stephen Malkin and Changsheng guo, May 2007.
- Handbook of machining with grinding wheels by by Ioan D. Marinescu, Mike P. Hitchiner, Eckart Uhlmann, W. Brian Rowe.

ADVANCED PRODUCTION TECHNOLOGY

Subject code	19KUP3C04	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	III

Unit - I

Types of plastics - Characteristics of the forming and shaping processes - Moulding of Thermoplastics - Working principles and typical applications of Injection moulding - Plunger and screw machines - Blow moulding - Rotational moulding - Film blowing - Extrusion - Typical industrial applications - Processing of Thermosets - Working principles and typical applications - Compression moulding - Transfer moulding.

Unit II

Principle and working and applications of unconventional machining processes such as Electric Dischargemachining (EDM), Electro- Chemical machining (ECM), Ultrasonic Machining (USM), and Abrasive Jet machining (AJM)

Unit III

Introduction - Co-ordinate positioning (Absolute, Incremental), use of sub routines, macros and canned cycles- CAD/CAM CNC Program - Tooling and work holding devices - Symbols used in program - Address characters function - G codes and M codes- identify different parts of the CNC turning machine - Carry out setting for CNC turning center - Set up of machine - Perform the necessary checks before allowing the machine to operation in full program run mode - Checks - Measure all dimension as per specification - Basic maintenance activities.

Unit - IV

CNC Machines- 2 axis CNC m/c - 3 axis m/c centre (VMC,HMC) terms in programming - Checks - CNC Programming operation - Preparing, Loading, storing in appropriate format providing part program, trial runs - Simulation [Command and format] - Reference position - Cutter radius offset - Tool length offset] - Cutter compensation function.

Turning operations : straight turning, taper turning, facing, grooving, parting off, thread cutting, drilling, reaming, boring, etc.,

Milling operations: e.g. milling of flat services; gang and straddle milling; milling of sunk and recessed surfaces, face milling, side milling, angular milling, slotting, slitting, key way cutting, face slot cutting, woodruff cutting, dovetail cutting, etc.

Unit - V

Overview - Need - Development of Additive Manufacturing Technology -Principle - AM Process Chain- Classification -Rapid Prototyping- Rapid Tooling - Rapid Manufacturing - Applications- Benefits - Case studies - Basics of Photo polymerization - Powder Bed Fusion - Extrusion Based System - Sheet Lamination Process - Droplet formation technologies - Three Dimensional Printing - Beam Deposition Process.

REFERENCE:

- Injection Molding Reference Guide by Jay.W.Carender

- CNC Machines by B.S.Pabla and M.Adithan : New age international publishers
- CNC Programming handbook by Peter Smid
- EDM handbook by E.Bud Guitrau
- Electrical Discharge Machining by Dr M P Jahan
- Tom Page "Design for Additive Manufacturing" LAP Lambert Academic Publishing, 2012.
- Andreas Gebhardt "Understanding Additive Manufacturing: Rapid Prototyping, Rapid Manufacturing" Hanser Gardner Publication 2011.

TECHNICAL DRAWING

Course code	18KUG4AL4	Credits	4	Year	II
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	IV

Unit I - Geometrical construction

Triangle (Equilateral triangle, Right angle triangle, Isosceles triangle, Acute triangle) -Rectangle, Rhombus, Trapezium, Circles -Regular Polygons (Square, Pentagon, Hexagon, Heptagon, Octagon)-Parabola (Tangent method, Offset method)-Ellipse (Parallelogram method, Four centre method, Concentric circles method)-Hyperbola-Cycloids -Involutives -Helix -Spiral curves.

Unit II-Projections

Orthographic (first angle and third angle) (10 simple exercises each) - Isometric (5 simple exercises) - Oblique (2D and 3D wire frame models) (3 simple exercises) - Blue print reading (Missing views - Missing Lines - Missing dimensions)

Unit III- Sectional View

Types of sectional view (Full section, Half section, Aligned section, Offset Section, Revolved Section, Removed section) - Detailing view.

Unit IV -Electrical and Electronics Symbols

Symbols of - DC armatures - alternators - field winding shunt, series and compound - relays - contactors - fuses - main switch - electric bell - earth - aerial - DPST - DPDT - TPST - Network link - ammeters - voltmeters - wattmeter - energy meters - frequency meters - power factor meters - timers - buzzers - transformers - auto transformers- Incandescent lamp-Fluorescent Lamp -Signal lamp- Push button- Fire alarm - Siren- Water Heater- Ceiling Fan- Exhaust Fan - Resistors - inductors - capacitors - diodes - transistors - FET - SCR - UJT - DIAC - TRIAC - MOSFET'S - LOGIC GATES - AND - OR - NOT - NAND - NOR - EXOR

Unit V- Introduction to AutoCAD

History of AutoCAD-Applications- Advantages over manual drafting - hardware requirements - software requirements - window desktop - AutoCAD screen interface - menus - toolbars - How to start AutoCAD - command groups - How to execute command - types of coordinate systems - absolute-relative-polar- Simple sketches (lines and curves)

Text Books:

- 1) Gopalakrishnan K.R., "Engineering Drawing" (Vol I & II combined), Subhas stores, Bangalore -2007
- 2) Shah M.B., and Rana.B.C., " Engineering Drawing", Pearson, 2nd edition, 2009.

Open Elective I- PRINCIPLES OF MANAGEMENT

Course code	18KUG4EL1	Credits	4	Year	II
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	IV

UNIT I: INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS

Definition of Management - Science or Art - Manager - managerial roles and skills - Evolution of Management - Scientific, human relations, system and contingency approaches - Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - **Current trends and issues in Management.**

UNITII: PLANNING

Nature and purpose of planning - planning process - types of planning - objectives - setting objectives - policies - Planning Tools and Techniques - **Decision making steps and process.**

UNIT III: ORGANISING

Formal and informal organization - organization chart - organization structure - types - Line and staff authority - departmentalization - delegation of authority - centralization and decentralization - Human Resource Management - HR Planning, Recruitment, selection, Training and Development, Performance Management.

UNIT IV: DIRECTING

Meaning, Principles and Functions- Motivation - **motivation theories - motivational techniques** - job satisfaction - job enrichment - leadership - types and theories of leadership - communication - process of communication - barrier in communication - effective communication - communication and IT.

UNIT V: CONTROLLING

System and process of controlling - budgetary and non-budgetary control techniques - use of computers and IT in Management control - **Productivity problems and management** - direct and preventive control - reporting.

TEXT BOOKS:

1. Stephen P. Robbins & Mary Coulter, " Management", Prentice Hall (India) Pvt. Ltd., 10th Edition, 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", Pearson Education, 6th Edition, 2004.

DRAFTING AND PLOTTING

Subject code	18KUP4C05	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	IV

UNIT - I

Intro of CAD - CAD Workspaces - Using The Application Menu, Ribbon And The QAT-Command Line, Dynamic Input And Auto Complete- Toolbars, File Tabs And The Menubar-Pallets And Short Cut Menus-Using Function Keys And Command Aliases- The Status Bar-An Introduction To Model Space And Paper Space- Quick Access the Drawings

UNIT - II

Start and Quitting CAD-Object Selection Methods, Undo Command- Working With Specific Units- **Working With The Coordinate System**- Using The Grid System With The Snap Feature- Pan , Zoom, Osnap,Ortho and Grips- Project related to until this Chapter

UNIT - III

Lines, Polylines and Their Uses-Arcs, Circles and its types-Points and Their Styles- Polygons , Rectangles And Ellipses- Methods To Create Precise Objects- Project related to until this Chapter. Trim and Extend Lines- Delete - The Move And Copy Commands-Stretching, Rotating and Scaling Objects- Offset and Mirror- Fillet And Chamfer- Types of Arrays and Object Properties- Project related to until this Chapter

UNIT - IV

Creating and Editing Layers- Layer Properties and Manager- Freeze, Thaw, On, Off, And Lock Dimensions and its Styles- Dimensioning Tools And Settings- Multileaders- Single and Multiline Text- Text Styles and Tables- Chapter Project

UNIT - V

Intro about Blocks and its uses- Creating Blocks and Editing Blocks- Inserting Blocks And Using Them- Attributed and Dynamic Blocks- The Effect Of Exploding Blocks- Chapter Project
The Difference between Model Space And Paper Space-**Viewports , Page Setup and Plotting**- Export Your File

REFERENCE:

- A text book of Engineering drawing by Roop Lal and Ramakant Rana
- Engineering graphics with Autocad by D.M.Kulkarni, A.P.Rastogi, A.K.Sarkar

Open Elective II- TOTAL QUALITY MANAGEMENT

Course code	18KUG5EL2	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	V

Unit - I INTRODUCTION

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, and Customer retention - Costs of quality.

Unit - II TQM PRINCIPLES

Leadership- Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - **PDSA cycle, 5s, Kaizen** - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

Unit - III TQM TOOLS & TECHNIQUES I

The **seven traditional tools of quality** - New management tools - **Six-sigma**: Concepts, methodology, applications to manufacturing, service sector including IT

Unit - IV TQM TOOLS & TECHNIQUES II

Control Charts - Process Capability - Quality Function Development (QFD) - Taguchi quality loss function - **TPM** - Concepts, improvement needs - Performance measures.

Unit - V QUALITY SYSTEMS

Need for **ISO 9000 - ISO 9001:2015, ISO 29990:2010** Quality System - Elements, Documentation, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

TEXT BOOK

1. Dale H.Besterfield, et al., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint (2006).
2. Janakiraman, B and Gopal, R.K, "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. L

TOOL DESIGN - I

Subject code	19KUP5C06	Credits	05	Year	III
No. of Lecture Hours	75	No. of Practical Hours	--	Sem	V

UNIT - I

Introduction - Jigs and Fixtures - Difference between Jigs and Fixtures - Advantages of Jigs and Fixtures - Elements of Jigs and Fixtures - Fool Proofing - Materials used in Jigs and Fixtures - Degrees of Freedom - 12 degrees of freedom - 6 points location principle (or) 3-2-1 principle of location - Essential features of Jigs and Fixtures- General Design Principles - Design steps - Common defects in Jig Design.

UNIT - II

Principles of location - location point - types of locators - pins and studs - V block - cup and cone location points - adjustable locating points - special adjustable stops - location from finished holes in the work - Diamond pin locator - types of clamps - lever clamp - hinged clamp - two way clamp - Swinging clamp - wedge clamp - eccentric clamping arrangement - Quick action clamp - Pneumatic and Hydraulic clamps.

UNIT - III

Materials for Jig bushing - press fit bushings - Fixed renewable bushings - slip renewable bushings - Liner bushings - screw bushings - miscellaneous type of drill bushings - bushing specifications.

Open drill jig - plate drill jig - template drill jig - channel drill jig - turn over drill jig - angle plate drill jig - closed box drill jig - leaf drill jig - Post jig - Pot jig - indexing drill jig - universal drill jig - design of template and leaf jigs.

UNIT - IV

Introduction: principles of fixture design - elements of fixtures - design consideration of locators and clamps for fixtures - types of fixtures - Design of turning fixtures - Mandrels - Type of mandrels - Boring fixtures - Milling fixtures - essentials of milling fixtures - method of locating milling fixtures with respect to cutter position - Grinding fixtures - surface grinding and cylindrical grinding.

UNIT - V

Introduction - limit gauges -Taylor's principle of limit gauging - Application of limit gauges - gauge makers tolerance - allowance for gauge wear - material for limit gauge - three basic types of limit gauges - Disposition of gauge tolerance and wear allowance - plug gauge - snap gauge - ring gauge - thickness and length gauges - recess gauge - step gauge - position and receiver gauges - IS specifications for gauges - Design of plug and Snap gauges.

Text Books:

1. Donoldson.C and Others, "Tool Design", Tata McGraw Hill, 1978
2. Kempster, "Introduction to Tool Design and Jigs and Fixtures", ELBS

Reference Books:

1. ASTME, "Hand book of Fixture Design"
2. Korsakov, "Fundamental of Fixture Design", MIR Publication, Moscow
3. Goroshkin.A.K., "Jigs and Fixtures Handbook", MIR Publication, Moscow
4. Houghton, "Jigs & Fixture Design"

PROFESSIONAL ETHICS AND HUMAN VALUES

Subject code	18KUG6EL4	Credits	4	Year	III
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	VI

Unit I: Business Ethics

Conceptual approach - Emerging issues - Importance of Ethics - Understanding Ethics - Ethical decision making - Moral problem

Unit II: Managing Ethical Organization

Elements of ethical organization - Manager's role in influencing ethical climate - Codes of ethics - Codes of Contact - Ethical leadership - Ethical organization

Unit III: Business ethics in Profession

Ethical concern in Human Resource Management (HRM) - Ethical issue in marketing and advertising - Marketing ethics - Ethics in production management - work ethics

Unit IV: Corporate Governance and social responsibility:

Corporate Governance - Company management - Factors for success - Social responsibility towards stakeholders - Social responsibility of business

Unit V: Human Values

Wisdom Management - A person of character - Knowledge Management - Understanding success - Stress management

Text Book:

Business Ethics and Global Values by S.K Bhatia, Deep & Deep Publication Pvt. Ltd., New Delhi

SAFETY ENGINEERING

Subject code	18KUG6EL5	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	VI

Unit-I Introduction

Evolution of modern safety concept- Safety policy - Safety Organization - line and staff functions for safety- Safety Committee- budgeting for safety - Risk assessment & management - Safety Education and training- Importance, various training methods - **First Aid**, Resuscitation, Bleeding, management of shock, Burns, scalds and accidents caused by electricity, Rescue and transport of casualty Role of management and role of Govt. in industrial safety, safety analysis.

Unit-II Safety prevention

Definitions and theories, Accident, Injury, unsafe condition, Dangerous occurrence- Cost of accidents- **Accident prevention**- Safety performance - Personal protective equipment- survey the plant for locations and hazards, part of body to be protected - Economic importance of accidents, Analysis of accident records, accident investigations.

Unit-III Safety in Material Handling

General safety rules, principles, maintenance, Inspections of turning machines, boring machines, milling machine, planing machine and grinding machines, CNC machines, electrical guards, work area, material handling, inspection - Heat treatment operations, paint shops, sand and shot blasting, safety in inspection and testing, pressure vessels, air leak test, steam testing, safety in radiography, personal monitoring devices, radiation hazards.

Unit-IV Shopfloor Safety

Automotive vehicle design, selection, operation and maintenance of motor vehicle - Basic **automotive road Signals, Symbols, Rules and Regulation** - safety on manual, mechanical handling equipment operations - Servicing and maintenance equipment grease rack operation wash rack operation - battery charging - gasoline handling - other safe practices - preventive maintenance - check lists - motor vehicle insurance and surveys.

Unit-V Electrical Safety

General principles of electric safety - Preventive maintenance - Electricity & Human body - Earthing / Grounding - Safety against over voltage, extra-low and residual voltages - Hazardous areas, Electrical insulation - Energy leakage - Electrical fires and Arc flash - Electrical causes of fire and explosion - **National electrical Safety code** - Safety in the use of portable tools.

Text Books:

1. C.Ray Asfahl , *Industrial Safety and Health management*, Pearson Prentice Hall,2003.
2. N.V Krishnan. *Safety Management in Industry* Jaico Publishing House, Bombay, 1997.

ENTREPRENEURSHIP DEVELOPMENT

Subject code	18KUG6EL6	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	VI

Unit I: Entrepreneurship

Meaning, Definition, Characteristics and Functions-Role of Entrepreneur in economic development -Types-Qualities of an Entrepreneurs - Classification of Entrepreneurs-Factors Influencing Entrepreneurship - Entrepreneurship development programme - Self Employment schemes - Government policies on Entrepreneurial development.

Unit II: Institutional Finance to Entrepreneurs

State Level Financial Institutions: State Financial Corporation (SFCS) - State Industrial Development Corporation (SIDCS) - Tamilnadu Industrial Investment Corporation (TIIC) - Small Industries Promotion Corporation of Tamilnadu (SIPCOT).

All Indian Financial Institutions:

Industrial Development Bank of India (IDBI) - Industrial Finance Corporation of India (IFCI) - Industrial Credit Investment Corporation of India (ICICI) - Industrial Rural Development Bank of India (IRDBI).

Unit III: Institutional Setup to Entrepreneurs

District Industries Centre (DIC) - National Small Industries Corporation (NSIC) - Small Industries Development Corporation (SIDC) - Small Industries Service Institute (SISI) - Indian Investment Centre - Kadhi and Village Industries (KVIC).

Unit IV: Incentives and Subsidies of State and Central Government

Subsidy For Market - Capital Assistance - Subsidized Services - Taxations, Benefits to SSI - Transport Subsidy - Seed Capital Assistance - Special Facilities for imports.

Unit V: Sources of Ideas

Preliminary Evaluation and Testing of ideas - Demand based industries and Resource based industries - Project Formulation - Project Identification-Evaluation-Feasibility Analysis-Project Report.

Text Books:

1. Radha V, Entrepreneurship Development, Prasanna Publication House, 2008.
2. Khaka SS, Entrepreneurship Development, S. Chand & Co. Ltd. 2010.
3. Vasant Desai. The Dynamics of Entrepreneurship Development and Management.
4. Gupta C. B, Srinivasan N.P. Entrepreneurship Development, S. Chand & Co. Ltd. 2011.

TOOL DESIGN - II

Subject code	19KUP6C07	Credits	05	Year	III
No. of Lecture Hours	75	No. of Practical Hours	--	Sem	VI

UNIT - I

Press Working Operations:- Operation for producing blanks – Shearing, cutting off, parting, blanking. Operation for cutting holes – Punching, piercing, slotting, perforating. Operations for progressive working – Notching, semi notching, lancing, parting, cutting off. Operations for size control – Trimming, slitting, shaving. Safety in press working.

Press Working Mechanism:- Presses according to their functions – energy producing press, force producing presses, stroke controlled presses. Press according to their energy supply – Mechanical, hydraulic, Pneumatic, electromagnetic presses. Presses according to their construction – Solid or gap frame, open back inclinable, knee frame, horning, open end or end wheel. Press according to their operation – Single action, double action, triple action, multi slide press.

UNIT - II

Types of Die Construction:- Cut off, drop through, return type, compound, combination, continental, sub press, follow die, progressive die, transfer die, shuttle die. Function and nomenclature of die components:- Die, die set, die plate, punch, stripper plate, Die spring, rubber keeper, stripper bolt, solid stripper, knockout plate, hold down plate, pad plate, blank holder, pressure pin, die cushion. Attachment components – Dowel, screw, key. Miscellaneous components – Heal, stop block, bolster plate, backing plate, pilot, gauges, insert, cams, hinges and rockers.

UNIT - III

Die Casting Processes:- Hot chamber process, Cold chamber process, low pressure die casting process, advantages and disadvantages, comparison of hot and cold chamber processes, applications, heat transfer in the die and methods of controlling die temperature.

Die Casting Materials:- Types of die casting alloys –metallurgy, melting & casting procedure and application of zinc based die casting alloys, Aluminum base alloys, Magnesium base alloys, Copper base alloys, Lead base alloys and Tin base alloys.

Die Casting Machines:- Plunger machine, air machine, modern cold chamber machines. Die locking methods, injection systems, automatic cycle control, interlock and safety devices in die casting machines.

Die Casting Defects: Definition, causes and remedies of defects – Shrink holes, Gas holes, Segregation, Shrink cracks, Porosity, Cold shuts, Flow lines & Blooms, Foliations, Hard spots, Surface draws and Depressions, Soldering, sink mark and excessive flash.

UNIT - IV

Die Casting Die Design: Flow system – Importance, metal flow systems in die casting dies, goose neck, nozzle, sprue, runners systems, shock absorbers, gate, gate area, gate velocity, air vent, overflow, determination of gate area. Procedure to calculate runner and gating dimensions using PQ2 diagram, calculating runner and gating dimensions without PQ2

diagram. Consideration of specification of die casting machines. Ejection systems – need and working of ejection system, Types of ejection system – sleeve, ring, blade

Injection Moulding Machines: Basic parts and functioning of an injection moulding machine. Types of injection moulding machine (Screw type & Plunger Type) – Single stage and two stage – Clamping unit (Toggle & Hydraulic) – Types of nozzles – Typical injection. Moulding cycle, Cycle time – Machine specifications (Definition only).

UNIT - V

Functional systems of injection mould – Sprue and runner – Core and Cavity- Shrinkage calculation – Core and cavity dimension. Parting surface – clamping – direct, indirect – Cooling System – Cooling Integer type cavity plates – Cooling integer type core plate – Cooling bolster – Cooling cavity inserts – Cooling core inserts – Water connection and seals. (Concept & Description of design only) – Ejection system: Ejector grid – Ejector plates assembly – Ejector rod, Ejector plate and ejector retaining plate – Methods of Ejection – Ejection from fixed half-Sprue puller.

Basic Procedure for Mould Design – Determination of mould size – Maximum number of cavities, Clamping force, Maximum clamping area, Required opening stroke. Computation of number of cavities, cavity layouts, number of parting lines, Design of runner and gate.

Alignment of Moulds: Functions of alignment, alignment with the axis of the plasticating unit, internal alignment and interlocking, alignment of large moulds. Changing of moulds – system for a quick change of moulds for thermoplastics, mould exchanger for elastomer moulds.

Text Books:

1. Pye.R.G.W., "Injection Mould Design", Affiliated East – west press pvt Ltd, 2000
2. Athalye.A.S., "Injection Moulding", 2nd Edn., Multi Tech Publishing Co., 1998
3. George menges and Paul mohren, "How to make Injection moulds", Hawer publishers, 1991

Reference Books:

1. Briston and Gosselin, "Introduction to Plastics", Newnes-Butterworths, London, 1970
2. Mills.N.J., "Plastics", ELBS, 1986
3. Dominick V.Rosato and Donald V.Rosato., "Injection Moulding Hand Book", CBS Publishers & Distributors, Delhi, 1987
4. Athalye.A.S., "Plastics Materials Handbook", Multi Tech Publishing Co., 1995
5. Athalye.A.S., "Moulding of Plastics", Multi Tech Publishing Co., 1998